



**DQ-003-2016052**

Seat No. \_\_\_\_\_

**B. Sc. (Sem. VI) Examination**

**April - 2022**

**Statistical Quality Control &  
Operation Research**

**Faculty Code : 003**

**Subject Code : 2016052**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- 1 (a) Give the answer of following questions : 4
- (1) A control chart contains \_\_\_\_\_ lines.
  - (2)  $R$  - chart Uncover assignable causes \_\_\_\_\_ samples.
  - (3) The inspection of 25 aircrafts revealed that there are 350 missing rivets in all. The appropriate control chart in this situation which can be prepared is \_\_\_\_\_.
  - (4) The lower limit of  $np$  - chart is \_\_\_\_\_.
- (b) Write any one : 2
- (1) Define chart for attributes.
  - (2) Write the difference between  $p$  - chart and  $n$  - chart
- (c) Write any one : 3
- (1) Write the difference between variable charts and attribute charts.
  - (2) Determine  $U$  - chart limits.
- (d) Write any one : 5
- (1) Discuss different assignable causes of variations.
  - (2) Write Short note: Theory of Runs.

- 2 (a) Give the answer of following question : 4
- (1) Sampling inspection plans are meant for \_\_\_\_\_.
  - (2) The percentage of maximum defective items finally accepted in a lot is known as \_\_\_\_\_.
  - (3) Producer's risk is referred as \_\_\_\_\_ error.
  - (4) Number of defects follows \_\_\_\_\_ distribution.
- (b) Write any one : 2
- (1) Find the probability of accepting a lot when fraction defective for the lot is 0.04, using single sampling plan (50, 10, 0).
  - (2) Derive ASN function for double sampling plan.
- (c) Write any one : 3
- (1) Explain LTPD and Producer risk.
  - (2) For single sampling plan (2000, 200, 2) find producer's risk and consumer risk when  $AQL = 0.005$  and  $LTPD = 0.035$  [ $e^{-1} = 0.368$ ,  $e^{-7} = 0.000912$ ]
- (d) Write any one : 5
- (1) Derive OC function for single and double sampling plan.
  - (2) Derive AOQ function for single and double sampling plan.
- 3 (a) Give the answer of following question : 4
- (1) Operations research is a \_\_\_\_\_ approach to problem solving for executives.
  - (2) If an optimal solution to a linear programming problem exists, it will lie at \_\_\_\_\_ of the feasible solution.

- (3) A basic feasible solution is said to be non-degenerative if the values of all \_\_\_\_\_ variables are nonzero and positive.
- (4) The \_\_\_\_\_ points of the convex set give the basic feasible solution to the linear programming.

(b) Write any one : 2

- (1) Define: Linear programming.
- (2) Define: Basic solution

(c) Write any one : 3

- (1) Explain General Mathematical form of LPP.
- (2) Write the limitation of linear programming problem.

(d) Write any one : 5

- (1) A company manufactures two types of items A and B. According to Government restriction, the company has to manufacture at least 20 items of A and 15 items of B. Looking to the working capacity of the company; it cannot make more than 80 items per week. For making each item of A, 15 machine hours and for making each item of B, 40 machine hours are required. The company cannot afford at the most 4000 machine hours per week. A profit of Rs. 1000 can be earned on each item of A and that of Rs. 3000 can be earned on each item of B. How many items of each type should be manufactured so as earn maximum profit? Solve by graphical method.

- (2) A person has to use two types of food  $F_1$  and  $F_2$ . He gets vitamin A, vitamin B and vitamin C from this food. The proportion of vitamins at each of food is as follow :

Vitamin	Food (in milligram)	
	$F_1$	$F_2$
$A$	1	1
$B$	100	10
$C$	10	100

He needs minimum 1 mg. of vitamin A, 50 mg. of vitamin B and 10 mg. of vitamin C for balanced diet. The price for each unit of food  $F_1$  is Re. 1 and for each unit of food  $F_2$  is of Rs. 1.5. How much units of each food is taken as to minimize the cost and to satisfy a balanced diet?

4 (a) Give the answer of following questions :

4

- (1) If there were  $n$  workers and  $n$  jobs there would be \_\_\_\_\_ solution.
- (2) In the assignment problem, the number of allocations in each row and column are \_\_\_\_\_.
- (3) If the total supply \_\_\_\_\_ total demand, then an additional column known as dummy demand centre added to the transportation table to absorb the same.
- (4) For a salesman who has to visit  $n$  cities which \_\_\_\_\_ ways of his tour plan.

(b) Write any one :

2

- (1) Explain Assignment problem with example.
- (2) Solve the following transportation problem by Minimum Row method and find Total Cost.

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$O_1$	21	16	25	13	11
$O_2$	18	18	14	23	13
$O_3$	32	27	18	41	19
Requirement	6	10	12	15	43

(c) Write any one :

3

- (1) Explain General Mathematical Model of Assignment Problem.
- (2) Solve the following transportation problem by Matrix minima and find Total Cost.

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$O_1$	8	5	9	7	20
$O_2$	6	4	2	10	40
$O_3$	6	1	3	3	60
Requirement	20	50	25	25	120

(d) Write any one : 5

- (1) Explain General Mathematical Model of Transportation problem.
- (2) Solve the following transportation problem by Vogel's method and find Total Cost.

	$D_1$	$D_2$	$D_3$	$D_4$	$D_5$	Supply
$O_1$	5	7	6	8	9	20
$O_2$	9	8	10	4	11	35
$O_3$	10	12	9	7	8	40
$O_4$	6	6	7	8	8	15
Requirement	15	10	20	30	35	110

5 (a) Give the answer of following question : 4

- (1) The game theory models are classified by \_\_\_\_\_.
- (2) When \_\_\_\_\_ exists Maximum and minimax value of game are same.
- (3) \_\_\_\_\_ game means that the sum of losses to the player equal the sum of gains to others.
- (4) A \_\_\_\_\_ game can be solved by all three methods.

(b) Write any one : 2

- (1) Define  $2 \times n$  game.
- (2) Define  $m \times 2$  game.

(c) Write any one : 3

- (1) State the assumptions of Game theory.
- (2) Explain two person zero sum game giving an example.

(d) Write any one :

**5**

- (1) How can two person zero game problem converted into a LPP?
  - (2) Write an algebraic method.
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